Project Title: **Nitrogen and Carbon Budget in an Old Field in Central Oklahoma**

Investigators: **Scott M. Holub (USEPA/ORD/NRMRL/GWERD; Ada, OK 74820; Holub.Scott@epa.gov)**
Eric E. Jorgensen (USEPA/ORD/NRMRL/GWERD; Ada, OK 74820)

Introduction to the problem: In many regions of the industrial world inputs of nitrogen through fertilization and atmospheric deposition can be quite high. These excessive inputs can lead to many deleterious effects on the environment and human health including elevated levels of nitrogen in rivers and groundwater. In much of the world, however, nitrogen inputs are only slightly to moderately elevated compared to historic levels. The effect that this relatively low but chronic nitrogen addition will have on ecosystem processes is not well known. The addition of a small amount of nitrogen may have positive as well as negative effects. Since most terrestrial plants are limited by the availability of nitrogen, one positive effect of moderate nitrogen addition could be additional sequestration of carbon dioxide (CO_2) from the atmosphere into plant biomass and soil carbon. Limiting increases in atmospheric CO_2 concentration would be valuable because CO_2, as a greenhouse gas, has been implicated in global climate change.

Background: One method to monitor the fluxes and stores of nutrients such as nitrogen and carbon is to construct a nutrient budget. A nutrient budget is a fundamental tool used to study the inputs, stores, and outputs of a given nutrient. The basic information provided by a nutrient budget helps determine whether an ecosystem is losing or accumulating a given nutrient. Nutrient budgets also serve as a foundation for other biogeochemical, environmental, and ecological research. Planning future research is difficult without a thorough understanding of the factors that influence the rates of nutrient import and export as well as the ecosystem pools responsible for nutrient storage. Nutrient budgets play a vital role in the identification of the key pools and processes that affect nutrient cycling in an ecosystem.

Objectives: 1) To quantify the major inputs, stores, and outputs of nitrogen and carbon in an old field in central Oklahoma, 2) To determine if the site is a net source or sink for nitrogen and carbon. 3) To determine if additional nitrogen and/or fencing have any effect on nitrogen or carbon storage or output

Approach: Each of 16 - 40 m by 40 m plots at the Center for Subsurface and Ecological Assessment Research (CSEAR) site near Gaar Corner, Oklahoma will be sampled on a schedule according to how frequently the nutrient pools are expected to change. The plots consist of four treatments: 1) control, 2) 16 kg/ha/yr added N (as NH4NO3), 3) fencing and 4) added N and fencing. Values from each treatment will be averaged and extrapolated over time as required to produce an annual budget.

Accomplishments to date (Aug 2003): Soil water and rain water collection equipment has been installed and biweekly sample collection, including soil respiration measurements, is ongoing.

Near future tasks: Collect soil and plant samples for Total C and N analysis.